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PROGRAM AND ABSTRACTS OF THE TWENTY-FIRST ANNUAL MEETING OF THE AMERICAN SOCIETY OF PARASITOLOGISTS

BOSTON, MASSACHUSETTS

DECEMBER 26, 27, and 28, 1946

PROGRAM[1]

THURSDAY AFTERNOON SESSION, DECEMBER 26, 2:00 PM, STATLER HOTEL (SALLE MODERNE).

Read

1. Studies on the Life Cycle and Viability of *Leishmania tropica.* (10 min) (Lantern) EDWARD P. OFFUTT, JR., University of Rochester.

2. Pantothenic Acid Depletion of Rats and *Trypanosoma lewisi* Infection. (10 min) (Lantern) ELERY R. BECKER, Iowa State College.

3. Precipitin Reactions to Fractions of *Trichomonas foetus.* (10 min) (Lantern) BANNER BILL MORGAN, University of Wisconsin.

4. The Effects of Bacteria on the Growth of *Trichomonas foetus.* (10 min) (Lantern) BANNER BILL MORGAN AND KARL RICHARD JOHANSSON, University of Wisconsin.

5. The Occurrence of Small Strains of *Endamoeba histolytica* in the Chicago Area. (5 min) OSCAR FELSENFELD, Mt. Sinai Research Foundation, Chicago.

6. Changes of *Endamoeba histolytica* under the Influence of Iodine Drugs. (7 min) VIOLA MAE YOUNG, Mt. Sinai Research Foundation, Chicago.

7. The Effectiveness of Short Treatments with Sulfonamides in Cecal Coccidiosis of the Chicken. (15 min) (Lantern) EMANUEL WALETZKY AND CARRIE OLA HUGHES, American Cyanamid Company, Stamford, Connecticut.

8. The Effect of Some Halogenated Arsonic Acids and Their Sodium Salts on *Eimeria tenella* Infection in Chickens. (15 min) (Lantern) NEAL F. MOREHOUSE, Dr. Salsbury's Laboratories, Charles City, Iowa.

9. The Inability of Drugs with Both Causal Prophylactic and Suppressive Action to Cure Established Infections with Avian Malaria. (15 min) STERLING BRACKETT AND EMANUEL WALETZKY, American Cyanamid Company, Stamford, Connecticut.

10. Attempts to Cultivate the Mosquito Phase of *Plasmodium relictum.* (15 min) (Lantern) GORDON H. BALL, University of California at Los Angeles.

11. The *in vitro* Agglutination of Erythrocyte-Free Avian Plasmodia. (15 min) (Lantern) L. A. STAUBER, H. A. WALKER, AND A. P. RICHARDSON, Rutgers University and Squibb Institute, New Brunswick, New Jersey.

[1] An alphabetical author index will be found at the end of the program. Extra copies of this Supplement, and portraits of parasitologists, will be on sale at the meeting.

12. Studies on *Plasmodium gallinaceum* Brumpt. VII. A Study of the Pathology in Young Chicks Infected by Sporozoites. (15 min) (Lantern) LLOYD R. HERSHBERGER AND G. ROBERT COATNEY, National Institute of Health.

13. Therapeutic, Prophylactic, and Curative Tests in Avian Malaria (*Plasmodium cathemerium*) with Metachloridine. (10 min) (Lantern) WENDELL GINGRICH, EUGENIA WORLEY SCHOCH, AND CORA ALICE TAYLOR, University of Texas.

By Title

14. Action of Streptomycin on *Endamoeba histolytica in vitro.* WILLIAM BALAMUTH AND MARY LOUISE WIEBOLDT, Northwestern University.

15. Incidence of Parasitism in Navy Personnel. JOHN L. AVERY, Naval Medical School.

16. The Relationship in Alcoholic Mice of Reduced Food Intake and Decreased Resistance to *Hymenolepis.* JOHN E. LARSH, JR., University of North Carolina.

FRIDAY MORNING SESSION, DECEMBER 27, 9:00 AM, HARVARD MEDICAL SCHOOL (BUILDING EII, LONGWOOD AVE.).

17. The Use of Vitamins in Mice to Prevent Alcoholic Debilitation to *Hymenolepis.* (12 min) JOHN E. LARSH, JR., University of North Carolina.

18. The Relation of Biotin and a Fat-Soluble Bacterial Growth Factor to the Course of Infection in Avian Malaria. (15 min) (Lantern) WILLIAM TRAGER, Rockefeller Institute for Medical Research, Princeton, New Jersey.

19. Effect of Sulfamethazine on Developmental Stages in the Life Cycle of *Eimeria tenella* of the Chicken. (10 min) (Lantern) MARION M. FARR AND EVERETT E. WEHR, United States Bureau of Animal Industry.

20. Cell Division in *Entamoeba gingivalis.* (15 min) ELMER R. NOBLE, University of California, Santa Barbara College.

21. Effects of Cold Temperatures on the Eggs of *Schistosoma japonicum.* (10 min) (Lantern) ERNEST CARROL FAUST, Tulane University.

22. The Distribution of *Schistosomiasis japonica* in Mindanao, Philippine Islands. (10 min) (Lantern) WILLARD H. WRIGHT, DONALD B. MCMULLEN, ERNEST CARROL FAUST, AND PRESTON M. BAUMAN, Commission on Schistosomiasis, Commission on Tropical Diseases, Army Epidemiological Board, Office of the Surgeon General, War Department.

23. Helminthic Infections among Natives of the Islands of Ponape and Truk, Eastern Carolines. (15 min) (Motion Picture) JOSEPH E. ALICATA, University of Hawaii.

FRIDAY MORNING SESSION, DECEMBER 27, 11:00 AM, HARVARD MEDICAL SCHOOL (BUILDING EII, LONGWOOD AVE.).

Presidential Address

24. This Wormy World. NORMAN R. STOLL, Rockefeller Institute for Medical Research, Princeton, New Jersey.

FRIDAY, DECEMBER 27.

12:30 PM. PARASITOLOGISTS' LUNCHEON, LONGWOOD TOWERS (LONGWOOD AVE. AND CHAPEL STREET).

1:30 PM. ANNUAL BUSINESS MEETING.

FRIDAY AFTERNOON SESSION, DECEMBER 27, 3:00 PM, HARVARD MEDICAL SCHOOL (BUILDING EII, LONGWOOD AVE.).

By Demonstration

23. Helminthic Infections among Natives of the Islands of Ponape and Truk, Eastern Carolines. (Also read) JOSEPH E. ALICATA, University of Hawaii.

25. *Sarcotaces arcticus* from *Sebastodes ruberrimus*. E. KUITUNEN, University of Toronto.

26. Causes of Bovine Dermatitis. DONALD W. BAKER, Cornell University.

27. The Development of the Malaria Parasite *Plasmodium lophurae* in Red Blood Cell Suspensions *in vitro*. WILLIAM TRAGER, Rockefeller Institute for Medical Research, Princeton, New Jersey.

28. A Blood Circulator Used in Experiments on the Culture of Malaria. W. B. REDMOND, Emory University.

39. Experimental Infection of Calves with the Small Stomach Worm, *Ostertagia ostertagi*. (Also read) DALE A. PORTER AND GEORGE E. CAUTHEN, United States Bureau of Animal Industry.

42. A Revised Classification of the Nematode Suborder Strongylina. (Also read) ELLSWORTH C. DOUGHERTY, University of California.

43. Method of Testing Fabrics and Ointments to Determine their Effectiveness as Barriers to Schistosome Cercariae. (Also read) ROBERT E. KUNTZ AND M. A. STIREWALT, Naval Medical Research Institute.

44. Two Molluscicides of Promise. (Also read) M. A. STIREWALT AND R. E. KUNTZ, Naval Medical Research Institute.

47. More Observations on the Life Cycle of *Dioctophyma renale*. (Also read) ARTHUR E. WOODHEAD, University of Michigan.

SATURDAY MORNING, DECEMBER 28, 9:00 AM, STATLER HOTEL (SALLE MODERNE).

SYMPOSIUM ON TRICHOMONAS AND RELATED FLAGELLATES
ORGANIZED BY HAROLD KIRBY, JR., VICE-PRESIDENT

Program

29. The Species of *Trichomonas* in Man. DAVID H. WENRICH, University of Pennsylvania.

30. The Physiology of *Trichomonas vaginalis*. GARTH JOHNSON, Ortho Research Foundation, Linden, New Jersey.

31. *Trichomonas vaginalis* in Tissue Cultures. (Motion picture) MARY JANE HOGUE, University of Pennsylvania.

32. A Summary of Research on *Trichomonas foetus*. BANNER BILL MORGAN, University of Wisconsin.

33. *Trichomonas gallinae*, Pathogenic Trichomonad of Birds. ROBERT M. STABLER, University of Pennsylvania.

34. Flagellate and Host Relationships of Trichomonad Flagellates. HAROLD KIRBY, JR., University of California.

SATURDAY AFTERNOON SESSION, DECEMBER 28, 2:00 PM, STATLER HOTEL (PARLOR A).

Read

35. Treatment of Loaiasis with Neostibosan. (15 min) (Lantern) HARRY M. ROSE AND JAMES T. CULBERTSON, Columbia University.

36. Studies on Sheep Parasites. VII. *Moniezia expansa* Infections. (10 min) (Lantern) PHILIP A. HAWKINS, Michigan State College.

37. Infection Experiments with the Hookworm *Bunostomum phlebotomum* in the Calf. (10 min) ROY L. MAYHEW, Louisiana State University.

38. Ova and Free-Living Larval Stages of *Bunostomum phlebotomum,* a Hookworm of Cattle. (5 min) EVA STANFORD KRUG AND ROY L. MAYHEW, Louisiana State University.

39. Experimental Infection of Calves with the Small Stomach Worm, *Ostertagia ostertagi.* (15 min) (Lantern for 2 × 2 slides) DALE A. PORTER AND GEORGE E. CAUTHEN, United States Bureau of Animal Industry.

40. Moderate Fowl Ascarid Infections Predisposing Chickens to Bacterial Toxin. (8 min) (Lantern) J. E. ACKERT AND DEAN S. FOLSE, Kansas State College.

41. Milk as a Factor in Fowl Ascarid Control. (7 min) (Lantern) J. E. ACKERT AND B. B. RIEDEL, Kansas State College.

42. A Revised Classification of the Nematode Suborder Strongylina. (15 min) (Lantern) ELLSWORTH C. DOUGHERTY, University of California.

43. Method for Testing Fabrics and Ointments to Determine Their Effectiveness as Barriers to Schistosome Cercariae. (8 min) ROBERT E. KUNTZ AND M. A. STIREWALT, Naval Medical Research Institute.

44. Two Molluscicides of Promise. (8 min) M. A. STIREWALT AND ROBERT E. KUNTZ, Naval Medical Research Institute.

45. Lethal Effect of Certain Xiphidio-cercariae on Various Fishes. (5 min) F. G. BROOKS, Cornell College, Wisconsin Conservation Department, and University of Wisconsin.

46. Two New Species of Dermatitis-Producing Schistosome Cercariae of the *elvae* Group. (5 min) F. G. BROOKS, Cornell College, Wisconsin Conservation Department, and University of Wisconsin.

47. More Observations on the Life Cycle of *Dioctophyma renale.* (15 min) (Lantern for 2 × 2 slides) ARTHUR E. WOODHEAD, University of Michigan.

48. Sandfly Control. (30 min) (Kodachrome technical motion picture 16 mm with sound track). MARSHALL HERTIG, Army of the United States.

49. Schistosomiasis. (30 min) (Kodachrome technical motion picture 16 mm. with sound track) MALCOLM S. FERGUSON, Rockefeller Institute for Medical Research, Princeton, New Jersey.

By Title

50. Echinococcus Infection (Hydatid Disease) in Louisiana. J. C. SWARTZWELDER, Louisiana State University.

51. The Susceptibility of Cotton Rats and White Rats to *Litomosoides carinii* in Relation to the Presence of Previous Infections. J. ALLEN SCOTT, NINA MAE SISLEY, AND V. E. STEMBRIDGE, University of Texas.

52. A Comparative Study of Ova of Four Species of Bovine Gastro-Intestinal Nematodes. EVA STANFORD KRUG AND ROY L. MAYHEW, Louisiana State University.

53. The Development of *Schistosoma mansoni* in its Intermediate Host, *Australorbis glabratus*. José F. Maldonado and Josefina Acosta-Matienzo, School of Tropical Medicine, San Juan, Puerto Rico.

54. The Relative Efficiency of Six Species of Mosquitoes as Developmental Host for *Dirofilaria imumitis* Leidy. B. V. Travis, United States Bureau of Entomology and Plant Quarantine.

55. Miscellaneous Parasites of the Bufoninae (Amphibia). A. C. Walton, Knox College.

56. Parasites of the Brachycephalidae and of the Hylidae (Amphibia: Salientia: Procoela). I. A. C. Walton, Knox College.

57. Parasites of the Hylidae (Amphibia: Hylinae). II. A. C. Walton, Knox College.

58. Follow-Up Examinations of Patients Infected with *Schistosoma mansoni* Treated with Pentavalent Antimonials. Federico Hernandez-Morales, José Oliver-Gonzáles, and Caroline K. Pratt, School of Tropical Medicine, San Juan, Puerto Rico.

59. Skin Reactions in Human *Schistosomiasis mansoni* to Antigen from *Planaria maculata*. James T. Culbertson, Harry M. Rose, and José Oliver-Gonzáles, Columbia University and School of Tropical Medicine, San Juan, Puerto Rico.

60. Cerebral Schistosomiasis and its Parasitological Consideration. H. Tsuchiya, Washington University, St. Louis, Missouri.

61. *Leucocytozoon bonâsae* Clarke in the Ruffed Grouse and its Development in the Black Fly, *Simulium venustum* Say. A. Murray Fallis and Douglas M. Davies, Ontario Research Foundation, University of Toronto.

AUTHOR INDEX

Showing program number, which is also abstract number of each paper

Author	Program and Abstract Number	Author	Program and Abstract Number
Ackert, J. E.	40, 41	Maldonado, J. F.	53
Acosta-Matienzo, V.	53	Mayhew, R. L.	37, 38, 52
Alicata, J. E.	23	McMullen, D. B.	22
Avery, J. L.	15	Morehouse, N. F.	8
Baker, D. W.	26	Morgan, B. B.	3, 4, 32
Balamuth, W.	14	Noble, E. R.	20
Ball, G. H.	10	Offutt, E. P., Jr.	1
Bauman, P. M.	22	Oliver-Gonzalez, J.	58, 59
Becker, E. R.	2	Porter, D. A.	39
Brackett, S.	9	Pratt, C. K.	58
Brooks, F. G.	45, 46	Redmond, W. B.	28
Cauthen, G. E.	39	Richardson, A. P.	11
Coatney, G. R.	12	Riedel, B. B.	41
Culbertson, J. T.	35, 59	Rose, H. M.	35, 59
Davies, D. M.	61	Schoch, E. W.	13
Dougherty, E. C.	42	Scott, J. A.	51
Fallis, A. M.	61	Sisley, N. M.	51
Farr, M. M.	19	Stabler, R. M.	33
Faust, E. C.	21, 22	Stauber, L. A.	11
Felsenfeld, O.	5	Stembridge, V. E.	51
Ferguson, M. S.	49	Stirewalt, M. A.	43, 44
Folse, D. S.	40	Stoll, N. R.	24
Gingrich, W.	13	Swartzwelder, J. C.	50
Hawkins, P. A.	36	Taylor, C. A.	13
Hernandez-Morales, F.	58	Trager, W.	18, 27
Hershberger, L. R.	12	Travis, B. V.	54
Hertig, M. A.	48	Tsuchiya, H.	60
Hogue, M. J.	31	Waletzky, E.	7, 9
Hughes, C. O.	7	Walker, H. A.	11
Johannsen, K. R.	4	Walton, A. C.	55, 56, 57
Johnson, G.	30	Wehr, E. E.	19
Kirby, H., Jr.	34	Wenrich, D. H.	29
Krug, E. S.	38, 52	Wieboldt, M. L.	14
Kuitunen, E.	25	Wright, W. H.	22
Kuntz, R. E.	43, 44	Woodhead, A. E.	47
Larsh, J. E., Jr.	16, 17	Young, V. M.	6

ABSTRACTS

1. *Studies on the Life Cycle and Viability of* Leishmania tropica, *in vitro.* EDWARD P. OFFUTT, JR., University of Rochester.

Packchanian reported in the Journal of Parasitology (1943, **29**: 275–277) that none of his strains of *Leishmania tropica* was viable, *in vitro,* for longer than 3 months. Most textbooks of parasitology specify that cultures of *L. tropica* should be subcultured at 2–4-week intervals and that the leptomonas form is the only stage of *L. tropica* observed *in vitro.*

A strain of *L. tropica* maintained by the writer for over 7 years, and originally procured from Harvard University, has frequently given cultures viable for more than 1 year, and often for 2 years, and has been capable of culture after such periods of time. Regular subcultures have been made at varying intervals up to 3 months, using blood-agar slants as routinely employed in the bacteriology laboratory overlaid with 1–2 ml of 0.85 per cent saline. In old cultures, active flagellated forms are infrequently observed, a preponderance of the forms present being leishmania-like bodies. Such cultures often yield abundant subcultures, thus leading the writer to suggest that probably *L. tropica* may show its leishmania stage *in vitro* just as the textbooks report for *L. donovani.*

2. *Pantothenic Acid Depletion of Rats and* Trypanosoma lewisi *Infection.* ELERY R. BECKER, Iowa State College.

It has been reported that rats inoculated with *Trypanosoma lewisi* after a short period of pantothenic acid depletion developed extraordinarily high populations of the flagellate in the blood, sometimes leading to death and intercurrent bartonelliasis. The blood picture showed an increase of neutrophiles at the expense of the lymphocytes. Recent experiments differed from the earlier ones in that the rats were depleted by omitting pantothenic acid from the composition of the ration rather than by destroying it with dry heat, and the *Bartonella* factor was eliminated by inoculating the seed rats from cultures of the trypanosome. The results are, in general, in conformity with the earlier ones in which *Bartonella* was a complicating factor, but the effects of the parasitism appear to be less severe.

3. *Precipitin Reactions to Fractions of* Trichomonas foetus. BANNER BILL MORGAN, University of Wisconsin.

Several fractions of *Trichomonas foetus* were prepared for precipitin studies. The organisms were grown on a modified blood-agar medium. The cultures for mass production of cells were grown in large test tubes or six-ounce bottles. The various antigens included protein and polysaccharide fractions from laked *T. foetus,* supernatant of laked trichomonads, Coca extracts of whole or lyophilized trichomonads, saline extracts of vaginae from rabbits infected with *T. foetus;* Coca extracts of vaginae from trichomonad-infected rabbits. Precipitin tests were conducted with these antigens against the sera of cows and bulls naturally infected with *T. foetus,* cows injected intramuscularly with *T. foetus,* and rabbits inoculated vaginally, intravenously, intramuscularly, and intraperitoneally with motile trichomonads. Control sera included blood from trichomonad negative cows, bulls, guinea pigs, and rabbits. The antigens were diluted from 1 : 1 to 1 : 256 with sterile physiological saline. The protein and polysaccharide fractions were adjusted to a pH between 7.0 and 7.3; Coca extract antigens were adjusted to pH 7.8. Approximately 0.05 ml of the diluted antigens were layered with the sera for the ring and precipitin formations. Results of the tests were not satisfactory because of non-specific reactions in normal sera. Various factors need to be understood before a precipitin test for the diagnosis of bovine trichomoniasis can be employed.

4. *The Effects of Bacteria on the Growth of* Trichomonas foetus. BANNER BILL MORGAN AND KARL RICHARD JOHANSSON, University of Wisconsin.

Certain bacteria have been found to accelerate and others to inhibit the growth of *Trichomonas foetus in vitro* as determined by direct microscopic counts of the trichomonads with a haemocytometer. Bacteria which definitely inhibited the growth of *T. foetus* were *Corynebacterium diphtheriae, C. pyogenes, C. xerosis, Staphylococcus albus, Staph. aureus, Streptococcus bovis* (five strains), *Strep. faecalis* (two strains), *Strep. salivarius, Strep. hemolyticus, Shigella dysenteriae, Sh. paradysenteriae, Escherichia coli* and *Aerobacter aerogenes.* Those species that only slightly inhibited the growth of this flagellate were *Vibrio comma, Neisseria catarrhalis, Strep. pyogenes, C. hofmannii* and *C. renale.* Bacteria that had no pronounced effect on the growth of *T. foetus* or which slightly accelerated the multiplication of this microorganism were *Bacillus subtilis, Pseudomonas aeruginosa, Sarcina* sp. and nine cultures of diphtheroids isolated from the genital tract of clinically normal breeding bulls. *Brucella abortus* (strain 19) induced very rapid multiplication of the trichomonads but did not permit as long a survival time as the control cultures. One species, *C. equi,* was outstanding in that it prolonged the life of *T.*

foetus some 288 hours beyond the 240-hour limit of pure cultures of this trichomonad. Bacterial filtrates and heat-killed cultures which were tested affected trichomonad growth in a manner comparable to the corresponding living bacteria cultured with *T. foetus*.

5. *The Occurrence of Small Strains of* Endamoeba histolytica *in the Chicago Area.* Oscar Felsenfeld, Mt. Sinai Research Foundation, Chicago.

Among 117 cases of amebiasis, ranging from asymptomatic to grave dysenteric cases, typical *E. histolytica* were found in 31, small strains (called also *E. minuta* or *E. minutissima* by some authors) in 86 instances. The small races were present in symptomless persons and in patients showing amebiasis of the II, rarely III, type according to the clinical classification of Craig. In unstained and iodine-tinged stool smears these organisms are not easily differentiated from *E. nana* and from yeasts, while the hematoxylin stain reveals the typical nuclear structure and the characteristics of the protoplasm. The small strains are difficult to cultivate. Treatment with iddine containing drugs was successful in most cases.

6. *Changes of* Endamoeba histolytica *Under the Influence of Iodine Drugs.* Viola Mae Young, Mt. Sinai Research Foundation, Chicago.

This study was carried out to determine certain changes occurring in *E. histolytica* during treatment with antiamebic iodine drugs. Fixed, haematoxylin-stained slides were made of fresh stools. During excretion of the drugs, fragility of the trophozoites increases. When Schaudinn's fixative is used, up to 15 per cent of acetic acid has to be added for proper fixation. Karyorrhexis is common. The karyosome cannot be observed in many cases. The nuclear ring is swollen, then disrupted. The nuclei of the cysts show similar changes. Mature cysts are rarely found. Vacuoles are often present in the cysts. These phenomena may cause diagnostic errors and, consequently lead to a premature interruption of treatment.

7. *The Effectiveness of Short Treatments with Sulfonamides in Cecal Coccidiosis of the Chicken.* Emanuel Waletzky and Carrie Ola Hughes, American Cyanamid Company, Stamford, Connecticut.

Severe experimental infections with *Eimeria tenella* in chicks one or two weeks old, producing 80 per cent control mortality, were treated with 2 per cent sulfaguanidine diets. Complete suppression of cecal lesions and oöcyst formation were not obtained with four days of treatment. However, even when treatment was not begun until 24, 48, or 72 hours after inoculation, one day of treatment saved most of the birds, and with two or more days of treatment, the weight gains surpassed those of the untreated infected controls, and approached those of the uninfected controls. Treated survivors were resistant to large challenge doses three weeks after the primary infection. Although some developed severe lesions, only an occasional bird died, and weight gains were far superior to those of previously uninfected controls. Many untreated controls died between 96 to 120 hours after inoculation, and although treatment begun at this time did not reduce mortality, the weight gains of the survivors were improved. Short treatments with 0.3 per cent sulfamethazine gave essentially similar results. The beneficial effect of short sulfonamide treatments relatively late in the course of severe experimental infections, suggests their usefulness in field outbreaks, which are generally milder, and tends to confirm the results of Karl Seeger (Delaware Agricultural Extension Circular 37).

8. *The Effect of Some Halogenated Arsonic Acids and Their Sodium Salts on* Eimeria tenella *Infection in Chickens.* Neal F. Morehouse, Dr. Salsbury's Laboratories, Charles City, Iowa.

The halogenated arsonic acids, 2-chloro phenylarsonic acid, 4-chloro phenylarsonic acid and 4-bromo phenylarsonic acid and the sodium salts of 4-chloro phenylarsonic acid and 4-bromo phenylarsonic acid have been found effective for the prevention of *Eimeria tenella* infection in chickens. The minimum concentration effective for the prevention of mortality from cecal coccidiosis and the maximum concentration tolerated have been determined for these compounds.

Concentrations as low as 0.0003% to 0.0040% in the drinking water and 0.0022% to 0.0055% in the feed did not prevent mortality from cecal coccidiosis. Concentrations of 0.0133% to 0.0264% in the drinking water and 0.0265% to 0.0551% in the feed were not tolerated since mortality from toxicity occurred in the groups of birds receiving dosages within these ranges. Hemorrhage was prevented at concentrations varying from 0.0026% to 0.0066% in the drinking water and 0.0055% to 0.0110% in the feed, indicating that these compounds can be effectively used at relatively non-toxic concentrations in poultry feed or drinking water for the prevention of *Eimeria tenella* infection in chickens.

9. *The Inability of Drugs with both Causal Prophylactic and Suppressive Action to Cure Established Infections with Avian Malaria.* Sterling Brackett and Emanuel Waletzky, American Cyanamid Company, Stamford, Connecticut.

The inability of quinine or atebrin to cure established infections with *Plasmodium gallinaceum* in the chicken in spite of their marked suppressive action on the erythrocytic stages, may be due to their ineffectiveness against the exoerythrocytic stages of this parasite. However, this explanation is inadequate for at least four other compounds which probably all have different modes of action, namely: sulfadiazine (#1), 2-sulfanilamido-5-chloropyrimidine (#2), 2-metanilamido-5-chloropyrimidine (#3), and 2,4-diamino-6-heptyl-1,3,5-triazine (#4). These compounds not only suppressed erythrocytic stages, but were also effective against exoerythrocytic stages since they prevented the establishment of sporozoite-induced infections when administered for two to four days from the time of sporozoite inoculation. However, this complete protective action was not found when seven days of drug treatment were begun at three days after sporozoite inoculation with #1 or #3, at four days with #2 or #2 plus #3, or at five days with #4, although the incubation periods were considerably prolonged. Compound #4 also acts more rapidly than the others against the erythrocytic stages. Compounds 1, 3 and 4 were also tested in blood-induced infections and failed to produce cures, although with sulfadiazine (#1) treatment lasted for four months during which parasites were not demonstrable by massive subinoculations of blood or representative organs. This failure of sulfadiazine is probably not due to the development of drug-fastness since repeated passage of parasites in birds treated with partially effective levels of sulfadiazine did not alter sensitivity to this drug.

10. *Attempts to Cultivate the Mosquito Phase of* Plasmodium relictum. GORDON H. BALL, University of California at Los Angeles.

Experimental culture of the stomachs of *Culex tarsalis* infected with *Plasmodium relictum* has been attempted in an endeavor to grow the sporogonic cycle *in vitro*. Starving the mosquitoes for from 36 to 48 hours before they are killed and thorough washing of the tissue in sterile media enables one to obtain the stomachs bacteria-free. A number of synthetic and so-called complete media have been used with and without plasm. Various mixtures of gases have been introduced into the cultures, and a modified roller-tube method has been employed. Mosquito tissue remains alive for as long as 7 days as indicated by rhythmic contraction of the hind-gut. The oöcysts of *P. relictum* have persisted apparently unchanged for 5 days, but no development of the oöcysts has been observed.

11. *The* in vitro *Agglutination of Erythrocyte-free Avian Plasmodia.* L. A. STAUBER, H. A. WALKER, AND A. P. RICHARDSON, Rutgers University and Squibb Institute, New Brunswick, New Jersey.

Injection of plasmodial material from ducklings elicits the production of anti-plasmodial antibodies in the sera of rabbits. This is true whether the plasmodial material consists of freshly drawn and washed infected erythrocytes, hemolyzed infected red cells or parasites freed from the containing erythrocyte by combined hemolysis and digestion and stored with or without added formalin (0.1–0.2%). All injected materials contain appreciable amounts of normal (uninfected) duck erythrocyte components necessitating repeated absorption of the rabbit sera with similar normal components before testing for anti-plasmodial antibodies. The slide agglutination test, using suspensions of the erythrocyte-free plasmodia as test antigens, was the most satisfactory method used to demonstrate the presence of the anti-plasmodial substances in the rabbit sera. Titers are low, 1–100 being the highest yet encountered, but the sera of normal rabbits or rabbits injected with materials from uninfected ducklings do not agglutinate the parasite suspensions after equivalent absorptions of these sera with normal duck cell components. Suspensions of *Plasmodium lophurae, P. cathemerium* and *P. circumflexum* and antisera prepared against each have been studied. Both group-specific and species-specific agglutinins have been demonstrated by appropriate absorptions with plasmodial suspensions.

12. *Studies on* Plasmodium gallinaceum *Brumpt. VII. A Study of the Pathology in Young Chicks Infected by Sporozoites.* LLOYD R. HERSHBERGER AND G. ROBERT COATNEY, National Institute of Health.

One hundred and fifty week-old White Rock chicks were each given "one mosquito equivalent" of *Plasmodium gallinaceum* sporozoites subcutaneously. Birds were killed in numerical order on each day beginning on day 2 and continuing through day 21, then at 3-day intervals through day 51, then weekly through day 93. The progressive histopathology was studied and related to the general course of the disease. Physical properties and spectroscopic characteristics of the malarial pigment will be presented.

13. *Therapeutic, Prophylactic and Curative Tests in Avian Malaria* (Plasmodium cathemerium) *with Metachloridine.* WENDELL GINGRICH, EUGENIA WORLEY SCHOCH, AND CORA ALICE TAYLOR, University of Texas.

Metachloridine (2-metanilamido-5-chloropyrimidine) has a high order of therapeutic activity

on blood-induced infections of strain 3H2–1 of *Plasmodium cathemerium* in the canary. The minimum effective dose is 0.0072 mg per day whereas that of quinine base is 0.24 mg per day, for 4.5 days (quinine equivalent of 33.33). Against sporozoite-induced infection it affords complete protection at 20 mg per day for 10 days and increases the prepatent period by 3 days at 0.02 mg per day for 4 days. However, when administered in maximum tolerated doses, more than 2000 times the minimum effective dose, in blood-induced infection either at the time of inoculation or during latent infection the drug did not effect cure.

14. *Action of Streptomycin on* Entamoeba histolytica in vitro. WILLIAM BALAMUTH AND MARY LOUISE WIEBOLDT, Northwestern University.

Experiments were conducted with a dual object: to test the action of streptomycin on trophozoites and cysts of *E. histolytica in vitro;* and to attempt to free masses of cultured amoebic cysts from the accompanying bacterial flora in starting bacteria-free cultures or those containing single species of selected bacteria.

The NRS strain used was accompanied by three species of gram-negative bacilli, one of which was *Escherichia coli.* The test media for trophozoites were horse serum—Ringer (1:6) and Balamuth's egg-yolk infusion (initial pH 7.3 ±); cysts were tested in distilled water adjusted to both acidic and alkaline values (pH 6.5 and 8.3). The viability of bacteria was tested by inoculation into sterile stock culture medium and fluid thioglycollate medium; that of amoebae by inoculation into 12-hour cultures of bacterial flora. Streptomycin (supplied by Commercial Solvents Corporation) was made up in distilled water and applied in the range 100–20,000 units per ml for 48–96 hours.

The bacterial flora was strongly inhibited at the higher concentrations but recovered slowly in thioglycollate medium. Amoebic cysts survived all concentrations. Trophozoites survived 10,000 units per ml for 48 hours (highest concentration tested), although relatively few recovered. These data do not agree with those of Anderson et al (1946) in Science, vol. 103.

In a few cases treated amoebic cysts were established in cultures preconditioned with single species of bacteria which subsequently contained only that bacterial type. (This investigation was supported by a grant from the Abbott Fund of Northwestern University.)

15. *Incidence of Parasitism in Navy Personnel.* JOHN L. AVERY, Naval Medical School.

During the five-year period, 1941–1945, the staff of the Department of Tropical Medicine of the Naval Medical School examined 19,512 Navy and Marine patients for evidence of intestinal parasites. The Willis brine flotation technic was used for the recovery of helminth eggs. A saline smear was examined for protozoa. The identification of all protozoa reported was confirmed on an iron-alum-haematoxylin-stained smear. The results presented herein are based on a single examination of each patient.

Negative 76.2 per cent; *Endamoeba histolytica,* large race 1.8 per cent, small race 1.9 per cent; *E. coli* 9.1 per cent; *Endolimax nana* 10.5 per cent; *Iodamoeba butschlii* 1.2 per cent; *Giardia lamblia* 3.0 per cent; *Dientamoeba fragilis* 1.6 per cent; *Chilomastix mesnili* 0.4 per cent; *Trichomonas hominis* 0.4 per cent; Hookworm 2.8 per cent; *Trichuris trichiura* 0.9 per cent; *Strongyloides stercoralis* 0.2 per cent; *Ascaris lumbricoides* 0.1 per cent. *Hymenolepis nana, H. diminuta, Enterobius vermicularis,* and *Taenia solium* occurred in less than 0.1 per cent of the patients examined.

16. *The Relationship in Alcoholic Mice of Reduced Food Intake and Decreased Resistance to* Hymenolepis. JOHN E. LARSH, JR., University of North Carolina.

Previous work has shown that alcohol reduces the resistance of young mice both to initial infection and to reinfection with *H. nana* var. *fraterna.* In a primary effort to demonstrate the mechanism of this debilitation, it was found that young mice given daily injections of 40 per cent alcohol soon developed a condition whereby they refused food for 11–14 hours after receiving the drug. To show the effect of this on natural resistance, non-alcoholic mice of the same age were forced to fast daily during the same period for the three weeks of treatment. During this time, mice of each group consumed similar amounts of food (3.2 gm per mouse per day), which was much less than that consumed by the non-alcoholic, non-fasting controls (5.2 gm per mouse per day). Correlated with reduced food intake of both groups of fasting mice was a greatly increased cysticercoid development (8.1–9.0 per cent, respectively) above that of the controls (3.6 per cent). In a repeat of this experiment, the results were similar. It seems clear, therefore, that, in this case, the effect of alcohol on resistance was indirect by interfering with normal food intake.

17. *The Use of Vitamins in Mice to Prevent Alcoholic Debilitation to* Hymenolepis. JOHN E. LARSH, JR., University of North Carolina.

It has been demonstrated in mice that alcohol reduces the natural resistance to *H. nana* var.

fraterna by interfering with normal food intake. In a search for the particular food factor or factors involved, the first tests were concerned with the influence of vitamins. Six groups of young mice of similar age and sex were selected. Three of these groups were the same as in the previous experiments on fasting, i.e., (1) an alcoholic group, (2) a non-alcoholic, fasting group, and (3) a non-alcoholic, non-fasting group (control mice). Matched with these in each case was a companion group treated identically but given in addition a daily injection of vitamins (Vita-Kaps—Abbott). The results of infections given after three weeks of treatment were as follows: alcoholic mice, 7.4 per cent development of cysticercoids; alcoholic mice given vitamins, 1.3 per cent; non-alcoholic fasting mice, 8.6 per cent; non-alcoholic fasting mice given vitamins, 3.4 per cent; control mice, 3.4 per cent; and control mice given vitamins, 1.5 per cent. Similar results were obtained later in repeating this experiment. It is clear, therefore, that both alcoholic debilitation and that produced by fasting was prevented by supplementing vitamins, which means that in both cases decreased resistance to *Hymenolepis* was due undoubtedly in most part to avitaminosis. Studies are in progress to determine, if possible, the particular vitamin(s) concerned.

18. *The Relation of Biotin and a Fat-Soluble Bacterial Growth Factor to the Course of Infection in Avian Malaria.* William Trager, Rockefeller Institute, Princeton, N. J.

In attempts to arrive at the mechanism of resistance to malaria which is disturbed by biotin deficiency, measurements have been made by a microbiological method of the apparent biotin content of the plasma of normal and malarious ducks and chickens. The biotin content of normal plasma is low, and is slightly lowered if the plasma is first extracted with ether. The growth activity of the plasma after extraction with ether represents the content of free biotin. The activity removed by ether represents the free ether-soluble growth factor capable of replacing biotin in the microbiological assay. If normal plasma is hydrolyzed with acid its growth activity in the biotin assay is increased several times. Since all of this increase can be removed by extraction with ether, the bound growth-stimulating material liberated by acid hydrolysis is not biotin but the ether-soluble factor. During infections with *Plasmodium cathemerium* and *P. lophurae*, both the free biotin and the bound ether-soluble factor in the plasma increase markedly, the increase commencing early in the course of the infection. In birds which recover, the free biotin returns to normal soon after the peak parasite number has been passed, but the bound ether-soluble factor remains high. In ducks which die from *P. lophurae* infection, the plasma shortly before death shows exceptionally high concentrations of free biotin and little or no bound ether-soluble factor. The bound ether-soluble factor is associated with the plasma lipoproteins.

19. *Effect of Sulfamethazine on Developmental Stages in the Life Cycle of* Eimeria tenella *of the Chicken.* Marion M. Farr and Everett E. Wehr, U. S. Bureau of Animal Industry.

To determine the action of sulfamethazine on the developmental stages of *Eimeria tenella*, a medicated mash containing one per cent of drug was fed to seven groups of birds as follows: Group 1, 24 hours before and 24 hours after inoculation; group 2, 24 hours after inoculation; group 3, 45 hours after inoculation; group 4, from the 45th to 72nd hour after inoculation; group 5, from the 72nd to 96th hour after inoculation; group 6, from the 96th to 144th hour after inoculation; group 7, from the 144th to 192nd hour after inoculation. An 8th group served as inoculated controls. As each group was taken off treatment the ceca of a freshly killed, treated bird and a control bird were examined for a comparison of progress of infection and of any possible therapeutic action of the drug. A portion of a cecum was also fixed in Bouin's solution, sectioned and stained for later study.

This study revealed that, in the presence of the drug, the sporozoites and many first generation schizonts apparently developed normally, some first generation schizonts became vacuolated and degenerated into a darkly staining central mass of material surrounded by fragments of cytoplasm, and most of the large second generation schizonts degenerated and appeared much the same as the affected first generation schizonts. Merozoite formation was, therefore, reduced and, as a result, very few gametocytes were produced; the gametocytes developed to maturity.

20. *Cell Division in* Entamoeba gingivalis. Elmer R. Noble, Santa Barbara College, University of California.

The interphase nucleus of *Entamoeba gingivalis* possesses a thin nuclear membrane with peripheral chromatin beads or plaques closely applied to its inner surface. The endosome consists of several (usually 3–4) granules, and the area between endosome and peripheral chromatin contains fine periendosomal granules.

During the prophase periendosomal granules are condensed about the endosome while the latter becomes dispersed, and the peripheral chromatin becomes thinner. Metaphase stages seem to be represented by nuclei with pale, minute granules evenly scattered throughout the

nucleus. Late anaphase stages show 5 chromosomes at each end of an elongated nucleus, and peripheral chromatin localized in the center periphery. The chromosomes are connected by crisscross fibrils. There is no evidence of astral rays, polar caps or of an intradesmose.

21. *Effects of Cold Temperatures on the Eggs of* Schistosoma Japonicum. ERNEST CARROLL FAUST, Tulane University.

In the schistosomiasis endemic areas in the Philippines, Formosa, and Celebes warm temperatures prevail throughout the year, but in the Yangtze valley, China, and in Japan the winter season is cool with occasional freezes. The effects of continued cold temperatures (40° F) have therefore been tested on eggs of *S. japonicum* obtained from stools of dogs infected on Leyte, P. I. Samples from 3 dogs have been studied: (a) Sedimented stool relatively free of mucus, passed Sept. 8, 1945; (b) sedimented stool relatively free of mucus, passed Oct. 31, 1945, and (c) sedimented stool with large amount of mucus, passed Oct. 31, 1945. Examinations were made at intervals through March 6, 1946, to determine percentage of immature and mature viable eggs, shells, degenerated and calcified ones. Two cover-glass preparations of each specimen were studied. Mature viable eggs were determined by the beating of their cilia or flame cells and movement of the miracidium inside the shell when the medium was raised to 75° F, as well as normal hatching. While progressive degeneration of previously viable eggs occurred in all samples, it was much more rapid in (c) than in (a) or (b). Percentages of viability were as follows: Sept. 8, (a) 37.0; Oct. 31, (a) 35.1, (b) 33.3, (c) 9.4; Nov. 27, (a) 27.7, (b) 33.3, (c) 9.4; Jan. 7, (a) 13.7, (b) 8.3, (c) 0; Feb. 14, (a) 5.6, (b) 4.2, (c) 0. The observations indicate over-winter survival of a fair proportion of eggs in stools essentially free of blood and mucus.

22. *The Distribution of Schistosomiasis Japonica in Mindanao, Philippine Islands.* WILLARD H. WRIGHT, DONALD B. MCMULLEN, ERNEST CARROLL FAUST, AND PRESTON M. BAUMAN. Commission on Schistosomiasis, Commission on Tropical Diseases, Army Epidemiological Board, Office of the Surgeon General, War Department.

In addition to the known endemic foci of schistosomiasis japonica in Surigao and Agusan Provinces (Tubangui and Pasco, 1941), surveys carried out in July and August, 1945, indicated additional endemic areas near Valencia, Province of Bukidnon, and in the Capasagan River valley, Province of Lanao. Twenty-three cases of the disease were diagnosed in Filipino civilians in hospitals in and near Valencia. In nearly all cases, infection was probably acquired in two places, Barrio Simaya and Sitio Inawaan, northeast of Valencia. Cases of the disease were diagnosed and infected *Oncomelania quadrasi* were collected near the Barrio Calasig, northeast of Lala, Province of Lanao. Additional persons from other barrios in this locality were found infected.

The disease was not encountered in an area around Davao. No *O. quadrasi* were discovered in this area although search was limited because of activity of enemy forces. However, there is evidence to indicate that American prisoners of war contracted the disease near the Davao Penal Colony, which our survey party was unable to reach. Stool examinations and snail surveys in the rice-growing sections on the eastern shore of Lake Lanao failed to indicate that schistosomiasis japonica is endemic in this region. No specmens of *O. quadrasi* were found in the area, although subsequently the snail was discovered in a single small focus on the north shore of the lake (Abbott, 1946).

23. *Helminthic Infection among Natives of the Islands of Ponape and Truk, Eastern Carolines.* JOSEPH E. ALICATA, University of Hawaii.

During July and August of 1946 a brief survey was conducted to determine the incidence of helminthic infection among natives of the island of Ponape and of the islands of the Truk Atoll. A single specimen of stool or blood was secured from each native. A total of 150 bloods and 50 stools were obtained in Ponape and 29 bloods and 26 stools were obtained in the Truk Atoll. The stools were examined for parasite ova by the direct smear, sedimentation and brine flotation techniques. The bloods were examined for microfilariae by the Knott's survey method. The parasites found, with their percentage incidences, were as follows: (Ponape) *Wuchereria bancrofti* (microfilariae), 14.0; Hookworms (species unidentified), 76.0; *Ascaris lumbricoides,* 44.0; *Trichuris trichiura,* 94.0; *Strongyloides stercoralis,* 2.0. (Truk) *Wuchereria bancrofti* (microfilariae), 20.6; Hookworms, 57.6; *Ascaris lumbricoides,* 50.0; *Trichuris trichiura,* 88.4; *Strongyloides stercoralis,* 11.5; *Enterobius vermicularis,* 3.8. The density of circulating microfilariae per slide (thick blood smear) in two natives from Ponape was 0 and 0 at 10 AM, and 4 and 30, respectively, at 10 PM. In five natives from Truk, the density of microfilariae was 2, 0, 1, 0, 1 at 10 AM, and 18, 2, 18, 5, 3, respectively, at 10 PM. The persons examined for microfilariae were adults of 20 or more years of age. The per cent incidence of filariasis by sex was as follows: (Ponape) males, 21.7; females, 6.6. (Truk) males, 18.1; females, 22.2. Clinical cases of filariasis, showing presence of hydrocele, enlarged epitrochlear, femoral and

inguinal nodes and epididymis, were noted. One case of elephantiasis of the leg was noted in Ponape but none in Truk.

24. *This Wormy World.* Norman R. Stoll, Rockefeller Institute for Medical Research, Princeton, New Jersey.

Presidential Address.

25. Sarcotaces arcticus *from* Sebastodes ruberrimus. E. Kuitunen, University of Toronto.

Sarcotaces arcticus Collett was found in the body cavity and subcutaneously in the red cod, *Sebastodes ruberrimus,* Pacific Coast of Canada. The copepods are enclosed in cysts made up from the connective tissues of the host. One female and one male were found in each cyst. The cyst opens on the skin of the fish and through this opening the nauplius larvae of the parasite are discharged into the sea. The females found were 15 to 70 mm long, the males 2 to 3 mm. The parasites mature chiefly during the summer.

26. *Causes of Bovine Dermatitis.* Donald W. Baker, Cornell University.

27. *The Development of the Malarial Parasite,* Plasmodium lophurae *in Red Blood Cell Suspensions* in vitro. William Trager, Rockefeller Institute, Princeton, N. J.

Multiplication of *P. lophurae* occurs in suspensions of duck red cells in either the medium used by Ball, Anfinsen, Geiman, McKee, and Ormsbee for *P. knowlesi* or in the red cell extract medium of Trager, if the suspensions are kept at 40° C in thin layers under a slow stream of 5 per cent CO_2–95 per cent air and are gently rocked. The parasites approximately double in numbers every day. By subculturing to fresh red cell suspensions every other day, they have been maintained *in vitro* for 8 days, at the end of which time they were still multiplying actively.

28. *A Blood Circulator Used in Experiments on the Culture of Malaria.* W. B. Redmond, Emory University.

This circulator consists of two Pyrex glass tubes one of which is placed inside the other. The inner tube is the blood tube. It is in the form of an incomplete circuit, the missing segment being supplied by an attached cellophane tube. Through the cellophane membrane the constituent compounds of the medium may pass but not the proteins of the blood. Both the medium and the blood are under pressure and circulation is obtained by variation of the respective pressures. The pressure on the blood may be increased or decreased as the experiments demand. Aeration of the blood is obtained through the circulating air. The percentage of oxygen may be regulated as desired. The pH of the blood is kept at normal by maintaining the hydrogen ion concentration of the medium. The pH may be determined at any time by means of a series of standard color tubes. Phenol red is used in identical concentrations in both the medium and the color tubes. Samples are readily obtainable for examination. The circulator is readily sterilized and aseptic conditions are maintained throughout the period of the experiment. Single experiments have been run for as long as 15 days.

29 to 34. *Symposium on* Trichomonas *and Related Flagellates.* Organized by Harold Kirby, Jr. (University of California), Vice-President of the Society.

No abstracts.

35. *Treatment of Loaiasis with Neostibosan.* Harry M. Rose and James T. Culbertson, Columbia University.

Three patients with loaiasis acquired in French Equatorial Africa have been treated with the quinquevalent antimony compound, neostibosan. Therapy consisted of the intensive administration of the drug by the intravenous route twice daily for a period of two weeks.

A man, aged 40, had no recent clinical manifestations of loaiasis but his peripheral blood at 11:00 AM contained an average of 447 microfilariae of *Loa loa* per 60 cubic millimeters. The total dose of neostibosan was 16.4 grams. Nine months after therapy he was asymptomatic and the microfilaria count was 141 per 60 cu mm, a reduction of 68 per cent.

A woman, aged 37, had suffered from recurrent fugitive or calabar swellings. No microfilariae of *L. loa* were demonstrable in the peripheral blood. The total dose of neostibosan was 11.1 grams. During six months since treatment the incidence and extent of the calabar swellings have been markedly reduced.

A girl, aged 9 years, had suffered constantly from recurrent, severe calabar swellings. No microfilariae of *L. loa* could be found in the peripheral blood. The total dose of neostibosan was 9.4 grams. During six months of observation following treatment the child has been free of symptoms except for one brief calabar swelling on the foot.

36. *Studies of Sheep Parasites. VII.* Moniezia expansa *Infections.* PHILIP A. HAWKINS, Michigan State College.

Observations have been carried on over the past four years with naturally acquired parasitic infections of sheep under flock conditions, the only deviations from normal management being that medication was at no time employed. *Moniezia* infections presented a markedly different picture in the lambs and ewes. Only a few ewes in the groups studied acquired an infection and these only a light infection as measured by egg counts. Their infection was acquired in May or June and had disappeared by late August or September. In contrast most of the lambs acquired heavy infections and lost them at about the same time as the ewes, although a few persisted longer. No distinct symptoms could be ascribed to *Moniezia* alone, lambs with or without tapeworms appearing much the same. Large numbers of proglottids were being passed when the symptoms of haemonchosis developed, and the conditions produced by this nematode, particularly in the early stages, are often ascribed to the tapeworm. In heavy infections of lambs with *Haemonchus contortus* a secondary rise in the tapeworm burden may occur, with the continued passage of large numbers of segments. In light infections with *H. contortus* this rise was not observed. Furthermore in groups given phenothiazine and salt to control nematode infections the *Moniezia* infections never reached the high levels of the above untreated groups although neither group was medicated for tapeworms. From the data obtained in this study, namely the spontaneous loss of *Moniezia* together with a lack of any marked pathology, treatment does not seem justified.

37. *Infection Experiments with the Hookworm* Bunostomum phlebotomum *in the Calf.* ROY L. MAYHEW, Louisiana State University.

The calves used in these experiments were obtained from the L. S. U. Dairy Department when they were between one and thirty-six hours old and raised under parasite-free conditions in the animal building of the Veterinary Science Department. Three animals have been inoculated by mouth with infective larvae. All began passing eggs between 59 and 84 days after receiving the larvae. One animal developed a severe diarrhea lasting about ten days about thirty days after being inoculated. Three other calves were inoculated by placing larvae on the skin of the flank. The animals were then fastened in stanchions in such a manner as to prevent licking the skin of any part of the body, in one instance six weeks and in the other two until eggs were recovered from the manure. Two animals developed a very severe bloody diarrhea 30 and 31 days after the application of the larvae which continued for 9 days in one and 18 days in the other. A very marked skin irritation developed over the area of application of the larvae in all three animals. Three additional calves began passing hookworm eggs at between 60 and 114 days of age after being raised under conditions free of parasitic infection. The animal that was positive at 114 days was not examined between the 78th and 114th days and it is believed that a positive examination would probably have been secured earlier than the 114th day. It seems evident that these three animals received the larvae during the few hours between birth and their transfer to the Veterinary Science Department.

38. *Ova and Free-Living Larval Stages of* Bunostomum phlebotomum, *A Hookworm of Cattle.* EVA STANFORD KRUG AND ROY L. MAYHEW, Louisiana State University.

Seven hundred ova recovered from three hosts that had pure infections were found to range in size from 79 to 117 μ long and 47 to 70 μ wide.

First stage larvae, recovered from manure samples that were from one to three days old, varied in length from 367.6 to 526.8 μ and in width from 16.1 to 20.8 μ, and were without sheaths. Ten larvae averaged 460.2 by 18.8 μ.

Second stage larvae, recovered from 1- to 6-day-old samples, ranged from 397.3 to 564.7 μ long by 15.1 to 23 μ wide. The average size of 57 larvae was 502.2 by 21.8 μ.

Third stage larvae, recovered from manure samples seven to forty-eight days old, varied from 443 to 633 μ by 19 to 26.5 μ, and 97 averaged 528.3 by 21.4 μ. Third stage larvae were slightly longer than those of the second but otherwise there was no sharp differentiation between them as individuals.

Some difficulty was encountered in determining the time of the second molt since larvae with sheaths could be found at all times after one to two days in fecal cultures, but in normal saline cultures the first sheath was not shed and third stage larvae thus had two sheaths. In saline cultures a few larvae with two sheaths were observed on the sixth day and on the seventh many were found. It has been demonstrated that larvae recovered from nine- to eleven-day-old manure cultures were of the third stage and infective by positive inoculations.

39. *Experimental Infection of Calves with the Small Stomach Worm,* Ostertagia ostertagi. DALE A. PORTER AND GEORGE E. CAUTHEN, U. S. Bureau of Animal Industry.

Jersey calves were fed third stage larvae of the nematode, *Ostertagia ostertagi.* Eggs appeared in the feces in from 19 to 31 days after infection. One calf continued to pass eggs for

nearly 6 months, others, until sacrificed in from 1½ to 7½ months after infection. By necropsy of other calves at intervals following infection it was determined that the larvae entered the gastric pits, matured in the fundus glands of the abomasum, and returned to the lumen to localize in the pyloric region some time during the third week following a single infection. In one animal, reinfected at frequent intervals, immature worms were still present in the tissue several months after the last exposure.

Each worm in the tissue produced swellings that appeared macroscopically as small, grayish nodules, having a minute central cavity. These occasionally showed small hemorrhages. The space occupied by worms 15 to 17 days old, ranged from 400 to 550 microns in diameter and at times extended to the muscularis mucosa. Aside from the cuboidal shape of the cells due to stretching, there was little evidence of injury. In animals necropsied later there was evidence of erosion and sloughing of the nodules. Seven and one-half months after a single dose of 268,000 larvae, 10 adult worms were present in the lumen of the abomasum, but all except 6 nodules had disappeared from the gastric mucosa.

40. *Moderate Fowl Ascarid Infections Predisposing Chickens to Bacterial Toxin.* J. E. Ackert and Dean S. Folse, Kansas State College.

Results of previous work indicated that chickens on a completely adequate diet and under good management could harbor moderate worm infections without showing ill effects. Tests were then run to determine if moderate infections of the fowl nematode *Ascaridia galli* will predispose chickens to bacterial infections.

Two groups of young chickens of the same age and weight were placed in separate cages. One group was parasitized with about 300 *Ascaridia galli* eggs. Two weeks later both groups were given small injections of Botulinus Toxin Type A. In two tests upon 153 chickens the parasitized chickens showed Botulinus symptoms earlier and more severely than did the unparasitized groups. There were significantly more ailing birds and higher mortality in the parasitized groups than in the unparasitized (control) groups. Experimental evidence is presented, apparently for the first time, which shows that moderate infections of the fowl nematode, *Ascaridia galli,* will predispose chickens to the effects of a bacterial toxin.

41. *Milk as a Factor in Fowl Ascarid Control.* J. E. Ackert and B. B. Riedel, Kansas State College.

Liquid skim milk was used as a factor in roundworm control. Young chickens which were parasitized with about one hundred eggs of the fowl nematode, *Ascaridia galli,* were fed an adequate ration and also given liquid skim milk on alternate days.

In five tests the chickens that received the skim milk were found to harbor only two-fifths as many worms as did the groups of chickens whose diet was similar except for the liquid skim milk, which was replaced by water. The milk supplement thus appears to be a valuable factor in controlling this large roundworm of chickens. It also aids in producing smoother feathers at an earlier period of development.

42. *A Revised Classification of the Nematode Suborder Strongylina.* Ellsworth C. Dougherty, University of California.

The nematode suborder Strongylina, 1936, comprises forms which in the adult stage are symbiotic (i.e., commensalistic or rarely parasitic) with vertebrates of the tetrapod classes: Amphibia, Reptilia, Aves, and Mammalia. Strongylines are distinguishable by the possession, at the male posterior end, of a cuticular copulatory *bursa* supporting five groups of digitiform *rays,* and, in the female reproductive system, of modified muscular uterine termini, or *ovejectors.*

The following 6 families and 14 subfamilies are here recognized: (1) Diaphanocephalidae Travassos, 1920; (2) Syngamidae Leiper, 1912; (3) Strongylidae Baird, 1853: with Cloacininae Stossich, 1899; Oesophagostominae Railliet, 1915; Strongylinae Railliet, 1885; (*Incertae sedis: Ransomus* Hall, 1916); (4) Metastrongylidae Leiper, 1909: with Filaroidinae Skrjabin, 1933; Pseudaliinae Railliet & Henry, 1909; Metastrongylinae Railliet & Henry, 1909; Protostrongylinae Kamenskii, 1905; (5) Ancylostomatidae Nicoll, 1927: with Globocephalinae Travassos & Vogelsang, 1932; Uncinariinae Rosenau, 1914; Ancylostomatinae Nicoll, 1927; (6) Trichostrongylidae Leiper, 1912: with Trichostrongylinae Leiper, 1909; Strongylacanthinae Yorke & Maplestone, 1926; Heligmosominae Travassos, 1914; Skrjabingylinae Skrjabin, 1933; (*Incertae sedis: Ollulanus* Leuckart, 1865).

The suborder probably arose in the Palaeozoic from the suborder Rhabditina with the evolution of the stem amphibians. These proto-strongylines have perished. Morphologically the Syngamidae are the most primitive of existing strongylines, but have survived only as a few forms in mammals and birds. The Diaphanocephalidae are restricted to snakes and must have arisen as parasites of reptiles. The other four families presumably developed in the mammals or

mammal-like reptiles and where found elsewhere are secondarily adapted to new host groups. Whole families of strongylines may well have perished with the Mesozoic reptiles.

43. *Method for Testing Fabrics and Ointments to Determine Their Effectiveness as Barriers to Schistosome Cercariae.* Robert E. Kuntz and M. A. Stirewalt, Naval Medical Research Institute.

As the war moved toward endemic schistosomiasis areas there was demand for protective measures to reduce infection of military personnel. Not only were new methods of protection studied and tested but there was also a desire to determine what protection could be expected from the usual GI clothing. As new fabrics were developed and suggestions made for using prepared ointments to be applied to the body surfaces or clothing it was necessary to develop a quick but reliable testing method to determine how effective these barriers might be.

The cercariae of *Schistosomatium douthitti* are capable of producing a well-defined rash with local inflammatory reaction at the site of penetration into a mammal's skin. Rabbits with shaved bellies were used as test animals since experiment had demonstrated that they manifest a rather uniform reaction to cercariae. Four containers, 1½″ lengths of 1″ glass tubing, were held securely against the skin of an anaesthetized rabbit by a rubber belt. Ointments to be tested were applied to skin bulging into test containers. Approximately 10 ml of water with a known number of cercariae was introduced into the open containers. After a 30-minute exposure the water and cercariae were pipetted from test tubes. For the clothing, a piece of test fabric was stretched over one end of a smaller tube and held in place with a rubber band. The tube of smaller diameter was inserted into the larger, original test container until the cloth was approximately 1 mm above the skin, the cercariae were placed in container above the sample. After a 60-minute exposure the belt with containers was removed. Penetration sites were counted 4–16 hours later to determine how many cercariae had passed the barriers.

44. *Two Molluscicides of Promise.* M. A. Stirewalt and Robert E. Kuntz, Naval Medical Research Institute.

Fifty preparations were screened as possible molluscicides for the eradication, within limited areas, of the snail vectors of schistosomiasis. Of these, eight were lethal to the snails tested at sufficiently low rates of application for emergency use. Two possess all of the following desirable characteristics: they are lethal to snails and to cercariae at the rate of application of 0.5 ppm; they are gradually soluble in water; they may be applied as a dust, in aqueous solution, or in an oil emulsion; and they appear to be unaffected by the organic content of the water.

45. *Lethal Effect of Certain Xiphidiocercariae on Various Fishes.* F. G. Brooks, Cornell College, Wisconsin Conservation Department, and University of Wisconsin.

In connection with life history studies on the cercariae of the snails of Carrol Lake, Oneida County, Wisconsin, it was noticed that certain stylet cercariae in high concentration were lethal to various fishes. Controlled experiments run on five stylets indicated that the cercariae, to which the provisional designations D, S, and Eta have been given pending the publication of their descriptions, were lethal to sunfish, perch, and large mouth bass when they were placed in battery jars with from three to forty-eight infested snails, while *Cercaria Gamma* and the cercaria of *Plagiorchis ameiurensis,* McCoy, 1928 were not. The fish were killed in from three and one-half hours to three and a fraction days depending upon the species of cercaria and the concentration. As many as 46,875 *Metacercaria D* were recovered by the digest method, but either no cercariae or small numbers of them (1 to 18) were recovered by digest of the other two lethal species, though they could be recovered by dissection. The fish killed by *Cercaria D* showed hemorrhage of the fins, gills, and lips.

46. *Two New Species of Dermatitis-Producing Schistosome Cercariae of the* Elvae *Group.* F. G. Brooks, Cornell College, Wisconsin Conservation Department, and University of Wisconsin.

Two cercariae capable of producing "swimmer's itch" were found infesting snails of Carrol Lake, Oneida County, Wisconsin. Both closely resembled *C. Trichobilharzia ocellata* except in size relationships. Careful measurements made by Talbot's method indicate that these species are different from all members of the group previously described.

The hosts of the two species are *Lymnaea stagnalis jugularis* and *Physella sayii.* Complete descriptions of the two forms will be published.

47. *More Observations on the Life Cycle of* Dioctophyma renale. Arthur E. Woodhead, University of Michigan.

Since the report in March 1946 at St. Louis, two more specimens of the "over age," 10-mm form have been found. One specimen has been fed to a ferret for development. More information has been secured on the form which may prove to be the infective fourth stage larva. This form is well developed and ready to molt.

48. *Sand Fly Control.* Marshall Hertig, Sanitary Corps, Army of the United States.

This film illustrates in live action and animation certain phases of the control of *Phlebotomus* and the sandfly-borne diseases:

A. Life history of *Phlebotomus*, geographical distribution, types of breeding places.

B. Sandfly-borne diseases: sandfly fever, cutaneous and muco-cutaneous leishmaniasis, kala-azar, bartonellosis.

C. Protective measures under field or temporary conditions: house- and area-control with DDT.

This official War Department film was produced for the Office of the Surgeon General by the Signal Corps, with Major Hertig as technical adviser.

49. Schistosomiasis. (Motion picture.) M. S. Ferguson, Rockefeller Institute for Medical Research, Princeton, N. J.

The three types of schistosomiasis are depicted by photography, photomicrography, and animation. The life cycle of the causative organisms and the geographical incidence, epidemiology, clinical effects, and pathology both in the acute and chronic stages, treatment, laboratory diagnosis, and control of the diseases in military forces are shown.

This official War Department film was produced for the Office of the Surgeon General by the Signal Corps with the author as technical adviser.

50. *Echinococcus Infection (Hydatid Disease) in Louisiana.* J. C. Swartzwelder, Louisiana State University.

The total number of cases of hydatid disease reported from Louisiana through 1938 was eight. Since the 1938 report, 7 new cases have been diagnosed in New Orleans. The final diagnosis was based upon examination of the cysts and their contents. Three of the 7 new infections were in natives of Louisiana; of these, two were Negroes. For record purposes, the following data on the new cases are presented. In 1938 an Echinococcus cyst of the liver was diagnosed in a white male 30 years of age who was a native of Holland. Three cases of Echinococcus cyst of the liver occurred in 1939. One was a Negro male native of Louisiana aged 54; the second was a white female 59 years of age who was born in Italy; and the third case was a white male of Italian nativity. In 1940 an echinococcic cyst of the brain occurred in a white male, 23 years of age, native of Louisiana. In 1941 another case of hydatid cyst of the brain was diagnosed; the patient was a Negro male aged 30. In 1943 an Echinococcus cyst of the liver was diagnosed in a white male 51 years of age, who was born in Italy. A review of the 15 cases of Echinococcus infection which have occurred in Louisiana reveals that 10 of these have been in native-born individuals of the United States, four of whom were Negroes.

51. *The Susceptibility of Cotton Rats and White Rats to* Litomosoides carinii *in Relation to the Presence of Previous Infections.* J. Allen Scott, Nina Mae Sisley, and V. A. Stembridge, University of Texas Medical Branch.

Preliminary experiments with *Litomosoides carinii,* the filarial worm of the cotton rat, indicate that the presence of an infection with mature worms does not inhibit the establishment of an additional infection in cotton rats. There is also a suggestion that previously uninfected white rats are not always as readily infected as similar cotton rats. For example, in one experiment four animals were placed simultaneously, for a period of 10 days, in a tank containing an infected colony of tropical rat mites. Upon removal they were treated to kill all their mites, and were held in mite-free cages for an additional 25 days. The two white rats harbored 9 and 18 immature worms respectively, one cotton rat harbored 582 immature worms and no mature worms, and the other cotton rat harbored 106 mature worms and 898 immature worms. There was no difficulty in distinguishing the immature from the mature group of worms in this latter animal, as the smallest mature worm was a 14 mm male while even the females of the immature group did not exceed 11 mm. In another experiment two previously uninfected cotton rats harbored 324 and 538 worms respectively as compared to two parallel white rats harboring 405 and 92 respectively. The observations on white rats especially will need confirmation since the conclusions depend on negative data. White rats more frequently than cotton rats develop connective tissue tumors of the type demonstrated at the St. Louis meeting last March.

52. *A Comparative Study of Ova of Four Species of Bovine Gastro-intestinal Nematodes.* Eva Stanford Krug and Roy L. Mayhew, Louisiana State University.

A comparative study of ova of four species that are suspected of being the nematodes of greatest economic importance in Louisiana, was made to establish a method of differentiation among them in fecal samples. They are *Cooperia* sp., *Haemonchus contortus, Oesophagostomum radiatum,* and *Bunostomum phlebotomum.*

Ova from the latter three species were observed and measured in fecal samples from

experimental animals with pure infections. Ova of *C.* sp. were obtained directly from the females. Ova, before oviposition, were also observed and measured from *B. phlebotomum* females.

The size factor was the common feature of differentiation among these species. Ova of *C.* sp. were distributed in a range of 59 to 93 by 24 to 46 microns. Ova of *H. contortus* were distributed in a range of 58 to 102 by 37 to 59 microns. Ova of *O. radiatum* were distributed in a range of 73 to 120 by 38 to 70 microns. Ova of *B. phlebotomum,* after oviposition, ranged in size from 79 to 117 by 47 to 70 microns. Hookworm ova, before oviposition, were distributed over a range of 69 to 120 by 31 to 73 microns.

The sizes of individual ova of each of the species were found to vary in the following order—*C.* sp. (smallest), *H. contortus, A. radiatum* and *B. phlebotomum* (largest). The range covered by the ova of *B. phlebotomum,* that were measured before oviposition from 23 different adult hookworms recovered at postmortem from six different hosts was found to vary greatly between different adult females from the same host and from different hosts.

The shell of the hookworm egg was relatively thick and more or less rough while in the case of the other species studied the shell was thin and smooth. The *Cooperia* eggs differed in shape from those of the stomach and nodular worms in being a more elongate oval. The eggs of the hookworm were brownish in color while those of the other species were colorless or nearly so.

53. *The Development of* Schistosoma mansoni *in its Intermediate Host,* Australorbis glabratus. José F. Maldonado and Josefina Acosta-Matienzo, School of Tropical Medicine, San Juan, Puerto Rico.

In spite of the importance of the schistosomiases, there is actually scant or imperfect knowledge concerning many of the biologic phenomena of the parasites involved, the intramolluscan and intramammalian phases of their development in particular. For the past two years, we have studied the development of *Schistosoma mansoni* in the snail *Australorbis glabratus.* Our observations tend to correct and improve the existing knowledge on this aspect of the life cycle.

The changes undergone by the parasite from the time the miracidium enters the snail till the cercariae are formed were observed in detail, and the general outline of the cycle was found to be as follows:

The miracidium may penetrate and settle at any point in the head-foot organ and tentacles, at times moving distally to the kidney and even near the digestive gland. Wherever it settles, it soon develops into an intricately convoluted tube, the mother sporocyst. Contrary to what some authors suggest, this stage is non-motile and, therefore, unable to migrate through the body of the host. It gives rise to numberless daughter sporocysts which begin to leave the mother form around the eighteenth day. The daughter sporocysts migrate towards the digestive gland and ovotestis where they settle and give rise to cercariae. Occasionally, some may fail to reach these sites, settling anywhere in the body of the host instead.

A complete account of the work will appear, in the near future, in the Puerto Rico Journal of Public Health and Tropical Medicine.

54. *The Relative Efficiency of Six Species of Mosquitoes as Developmental Hosts for* Dirofilaria immitis *Leidy.* B. V. Travis, U. S. Bureau of Entomology and Plant Quarantine.

Six species of mosquitoes were studied on Guam, M. I., to determine their relative efficiency as developmental hosts for *Dirofilaria immitis* Leidy; they were as follows: *Culex jepsoni* Theo., *C. annulirostris* Skuse, *C. quinquefasciatus* Say, *Aedes aegypti* (Linn.), *A. pandani* Stone, and *A. guamensis* Farner and Bohart. The average number of infective-stage larvae in these species of mosquitoes was: 5.5, 2.3, 0.6, 0.4, 0.2, and 0.2, respectively. The respective percentages of the mosquitoes infected with infective-stage larvae was: 68, 57, 27, 23, 2, and 15.

55. *Miscellaneous parasites of the Bufoninae (Amphibia).* A. C. Walton, Knox College.

The annotated list of the parasites of the Bufoninae is completed by the following additions:

1. Schizomycetes: a. *Bacillus krusei* (Bufo bufo—Europe); b. *Brucella melitensis* (Bufo viridis—Europe); c. *Serratia anolium* (Bufo americanus—U.S.A.); d. *Borrelia bufonis* n. comb.—*Spirochaeta bufonis* Dobell, 1908 (Bufo bufo—Europe); and *B.* spp.? of Fantham, 1924 (Bufo regularis—Africa); e. *Treponema minutum* (Bufo bufo—Europe).
2. Ascomycetes: a. *Blastocystis bufonis* and *B. enterocola* (Bufo bufo—Europe).
3. Deuteromycetes: a. *Monilia batrachea* (Bufo bufo—Europe).
4. Annelida: a. *Haementeria montifera* (tadpoles and adults of Bufo americanus—U.S.A.); b. "Leech" (Bufo regularis—Africa).
5. Malacostraca: a. *Cubaris regulus* (Bufo regularis—Africa).
6. Acarina: a. *Eutrombicula alfreddugèsi* (Bufo americanus and B. fowleri—U.S.A.); b.

Hannemania edwardsi (Bufo variegatus—S. Amer.), and *H. penetrans* (Bufo fowleri—U.S.A.); c. *Ornithodorus erraticus* nymphs (Bufo mauritanicus—Africa), and *O. marocanus* nymphs (Bufo viridis—N. Africa); d. *Amblyomma cajennense* nymphs (Bufo marinus—S. Amer.), *A. dissimile* nymphs (Bufo marinus and B. paracnemis—S. Amer.), *A. göldii* nymphs, *A. rotundatum* nymphs, *A. varium* nymphs (all on Bufo marinus—S. Amer.), and *A.* sp.? (?=*A. scutatum*) nymphs (Bufo peltocephalus—Cuba); e. *Boöphilus microplus* nymphs (Bufo marinus—S. Amer.).

7. Pentastomida: a. *Raillietiella indica* and *R. mediterranea* (Bufo melanostictus—India and Zool. Gard., Eng.), and *R.* sp.? of Larrouse, 1925 (Bufo mauritanicus—Africa); b. *Kiricephalus pattoni* larvae (Bufo melanostictus—Ceylon).
8. Diptera: a. *Forcipomyia velox* (feeding on Bufo bufo—Europe); b. *Phlebotomus squamirostris* (feeding on Bufo bufo gargarizans—China); c. larval tabanids (encysted in Bufo regularis—Africa); d. *Cochliomyia americana* (exp. feeding on Bufo americanus—U.S.A.); e. *Lucilia bufonivora* larvae (in Bufo bufo and B. calamita—Europe); f. *Sarcophaga ruralis* (on Bufo bufo—Europe).

56. *Parasites of the Brachycephalidae and of the Hylidae (Amphibia: Salientia: Procoela). I.* A. C. Walton, Knox College.

The annotated list of the parasites of the two families indicates the following hosts and parasites:

A. Brachycephalidae. 1. Atelopus stelzneri (S. Amer.)—*Myxidium immersum, Nyctotherus ?cordiformis, N.* sp.? of Metcalf, 1923, and *Zelleriella atelopyxena stelzneri* (Protozoa). 2. Atelopus varius (S. Amer.)—*Zelleriella atelopodos, Z. atelopyxena,* and *Z. atelopyxena stelzneri* (Protozoa). 3. Dendrobates tinctorius (Cent. Amer.)—*Zelleriella dendrobatidis* (Protozoa). 4. Dendrobates typographus (Cent. Amer.)—*Zelleriella dendrobatidis* (Protozoa). 5. Phyllobates trinitatis (S. Amer.)—*Balantidium* spp.? of Metcalf, 1923, and *Zelleriella trinitatis* (Protozoa). 6. Rhinoderma darwini (S. Amer.)—*Protoopalina rhinodermatos* and *Zelleriella darwini* (Protozoa).

B. Hylidae (Hylinae). 1. Acris crepitans (U.S.A.)—Physalopteran larvae (Nematoda). 2. Acris gryllus (U.S.A.)—*Cosmocercoides dukae, Oswaldocruzia leidyi, O. minuta, Rhabdias ranae,* and *Thubunaea leiolopismae* (Nematoda); *Cylindrotaenia americana, ?Nematotaenia dispar,* and *Ophiotaenia magna* (Cestoda); and *Hexamita* sp.? of Wenrich, *Opalina virguloidea macronucleata, O. v. magninucleata, O.* sp.? of Trowbridge & Hefley, *Nyctotherus ?cordiformis, N.* sp.? of Metcalf, *Retortamonas dobelli, Trichomonas augusta,* and *Trypanosoma grylli* (Protozoa). 3. Agalychnis helenae (Cent. Amer.)—*Opalina helenae* (Protozoa). 4. Agalychnis morelettii (Cent. Amer.)—*Opalina morelettei* (Protozoa). 5. Phyllomedusa burmeisteri (Brazil)—*Oswaldocruzia subauricularis* (Nematoda). 6. Phyllomedusa dacnicolor (Cent. & S. Amer.)—*Balantidium* sp.? of Metcalf, and *Opalina helenae* (Protozoa). 7. Phyllomedusa lemur (Cent. Amer.)—*Cepedea globosa* (Protozoa).

57. *Parasites of the Hylidae (Amphibia: Hylinae). II.* A. C. Walton, Knox College.

1. Pseudacris brimleyi=P. occidentalis (U.S.A.)—*Agamascaris odontocephala, Cosmocercoides dukae, Oswaldocruzia pipiens,* Physalopteran larvae, *Rhabdias ranae,* and *R.* sp.? of Brandt (Nematoda); *Brachycoelium salamandrae,* and in tadpoles larval *Dasymetra villicaeca* and larval *Neorenifer aniarum* (Trematoda); larval *Centrorhynchus* sp.? of Brandt (Acanthocephala); and *Hexamita intestinalis, Nyctotherus ?cordiformis, Opalina chlorophili, O. hylaxena, O. oblanceolata, O. obtrigonoidea, O. pickeringii, O. ?triangularis, O. virguloidea, Trichomonas augusta,* and *Trypanosoma rotatorium* (Protozoa). 2. Pseudacris nigrita feriarum (U.S.A.)—*Oswaldocruzia leidyi* (Nematoda); and *Nyctotherus* sp.? of Metcalf, and *Opalina chlorophili* (Protozoa). 3. Pseudacris nigrita triseriata (Canada and U.S.A.)—*Cosmocercoides dukae* (Nematoda); *Brachycoelium salamandrae, Glypthelmins quieta,* and *Megalodiscus temperatus* (Trematoda); *Cylindrotaenia americana* (Cestoda); and *Nyctotherus ?cordiformis, Opalina chlorophili,* and *Trichomonas augusta* (Protozoa). 4. Pseudacris ocularis (U.S.A.)—*Oxysomatium americana,* and *Spironoura catesbianae* (Nematoda). 5. Pseudacris ornata (U.S.A.)—*Opalina chlorophili* (Protozoa). 6. Pseudacris streckeri (U.S.A.)—*Nyctotherus* sp.? of Metcalf, and *Opalina chlorophili* (Protozoa).

58. *Follow-Up Examinations of Patients Infected with* Schistosoma mansoni *Treated with Pentavalent Antimonials.* Federico Hernández-Morales, José Oliver-González, and Caroline K. Pratt, School of Tropical Medicine, San Juan, Puerto Rico.

Twelve patients passing numerous ova of *S. mansoni* in their stools were treated with urea stibamine (Squibb). The feces of all the patients were negative for ova one month after treatment and have remained so for a period of twelve months.

Out of twelve patients treated with neostibosan (Winthrop) the stools of only four have remained ova free eleven months after treatment.

Stibanose (Winthrop) apparently is ineffective in the treatment of schistosomiasis mansoni. Twelve patients were treated with this drug and their stools have remained positive for live ova eight and nine months after treatment. Also the number of eggs passed after treatment were not significantly different from the number observed before treatment.

59. *Skin Tests in Human Schistosomiasis* mansoni *with Antigen from* Planaria maculata. James T. Culbertson, Harry M. Rose, and José Oliver-Gonzalez, Columbia University and School of Tropical Medicine, San Juan, Puerto Rico.

Ten Puerto Rican patients at University Hospital, San Juan, Puerto Rico, whose stools contained eggs of *Schistosoma mansoni,* were injected intradermally with a carbolized saline extract of the powdered substance of *Planaria maculdta* (approximately 1–200 dilution). Within 10 minutes, 9 of these patients showed a positive skin reaction characterized by extension of the initial bleb and the appearance of pseudopodia. Twelve hospitalized individuals in New York City, none of whom had schistosomiasis and none of whom had at any time dwelt in a region where schistosomiasis is endemic, were tested with the same antigen. None of this group gave a positive skin response. This result indicates that an antigen similar to one of those in the human schistosomes occurs in *Planaria maculata* (Class Turbellaria). Additional tests in several patients showed, however, that the antigen was present in relatively small amount in *Planaria maculata* for, on dilution of the 1–200 extract more than 5 times (over 1–1000 dilution of the dry worm substance), no reaction in schistosomiasis patients could be elicited.

60. *Cerebral Schistosomiasis and its Parasitological Consideration.* H. Tsuchiya, Washington University, St. Louis, Missouri.

A veteran of the Philippine campaign was referred to Doctor Ernest Sachs by Doctor Charles H. Eyermann with a tentative diagnosis of brain tumor. A portion of granulomata removed by Doctor Sachs was submitted to me for parasitological examination. Pressed preparation of a slice of the granulomata revealed microscopically a number of ova of *Schistosoma japonicum.* Histological section also showed the typical pathology characterized by pseudotubercle formation surrounding the ova found singly or in cluster. Ova of the parasite were found in the stools, thus confirming the diagonsis. Faust and Meleney's sedimentation technic, (slightly modified) for detection of ova gave the best results, as ova were few. This was followed, in efficiency, by acid-ether concentration method. The presence of lateral knob was observed only in a few instances. Faust claims that the knob is less frequently present in ova found in the Philippines than those in China and Japan. During the course of fuadin therapy ova were recovered from the stools at all times except once, though very few in number. The mechanism by which ova reach the brain capillaries is still unexplained, but a few hypotheses are presented. Though cerebral complication is seemingly rare, it is suggested that such possibility should always be entertained in dealing with neurological manifestations associated with cases of schistosomiasis japonica.

61. Leucocytozoon bonasae *Clarke in the Ruffed Grouse and Its Development in the Black Fly,* Simulium venustum *Say.* A. Murray Fallis and Douglas M. Davies, Ontario Research Foundation, University of Toronto.

No abstract received.

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Oliver R. McCoy	1936–39	Charles W. Rees	1945–
Henry E. Ewing	1937–40	Lloyd A. Spindler	1945–
John F. Kessel	1937–40	Raymond M. Cable	1946–
Harley J. Van Cleave	1937–40	Lloyd E. Rozeboom	1946–

List of Meeting Places

1925	Kansas City	1932	Atlantic City	1939	Columbus
1926	Philadelphia	1933	Boston	1940	Philadelphia
1927	Nashville	1934	Pittsburgh	1941	Dallas
1928	New York	1935	St. Louis	1942	(New York, cancelled)
1929	Des Moines	1936	Atlantic City	1943	(No Meeting)
1930	Cleveland	1937	Indianapolis	1944	Cleveland
1931	New Orleans	1938	Richmond	1945	St. Louis

* Deceased.

IN MEMORIAM

Clarence J. Addis, Jr.

Otto Fuhrmann

AMERICAN SOCIETY OF PARASITOLOGISTS

LIST OF MEMBERS ELECTED

SINCE DECEMBER 1, 1945[1]

BAROODY, BAHIJ J., A.B. Timmonsville, South Carolina.

BELL, SAMUEL D., JR., A.B., M.D. Municipal Physician, Frederiksted, St. Croix, Virgin Islands.

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BOYD, ELIZABETH M., B.Sc., M.A. Department of Entomology, Cornell University, Ithaca, N. Y.

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BRITT, HENRY GRADY, B.S., M.A., Ph.D. Department of Biology, Martha Washington College, Fredericksburg, Virginia.

BROOKMAN, BERNARD, B.A. U. S. Public Health Service, c/o Hooper Foundation, University of California, San Francisco 22, California.

CAUTHEN, GEORGE E., B.A., M.S., D.V.M. U. S. Bureau of Animal Industry, Regional Laboratory, Auburn, Alabama.

CORPRON, RUTH ALEXANDRA, B.S., M.S. Department of Pathology, Charity Hospital, New Orleans, Louisiana.

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EADS, RICHARD B., B.S., M.S. Bureau of Laboratories, Texas State Health Department, Austin, Texas.

EDELMAN, MORTON HENRY, A.B., M.D. Mt. Sinai Hospital, New York, N. Y.

FIGGATT, WILLIAM BURNETT, B.S. Division of Zoology, National Institute of Health, Bethesda 14, Maryland.

FILES, VIRGINIA SHAULIS, B.S. Division of Zoology, National Institute of Health, Bethesda 14, Maryland.

FOLSE, DEAN SYDNEY, B.S., M.S., D.V.M. 4018 Harrison St., Kansas City 4, Missouri.

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KRULL, WENDELL H., Ph.D. Department of Bacteriology, Colorado State College, Ft. Collins, Colorado.

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MADALENA, ROSE L., A.B. Main Laboratory, U. S. Naval Hospital, San Diego 34, California.

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RAECKE, MARJORIE JEAN, B.S. Zoology Division, U. S. Bureau of Animal Industry, Beltsville, Maryland.

REIN, CHARLES ROBERT, B.S., M.D. Division of Serology, Army Medical School, Washington 12, D. C.

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[1] To October 1, 1946. The last complete membership list was printed in The Journal of Parasitology, 1942, 28 Supplement: 35–40. Names of members elected subsequently have appeared in Journal of Parasitology Supplements for 1944 and 1945.

RIEDEL, BERNARD B., B.A., M.S. Zoology Department, Kansas State College, Manhattan, Kansas.

RODRIGUEZ, AMADOR N., M.D. Department of Parasitology, Public Health Service of Chile, Santiago, Chile.

ROSENAU, BARBARA J., A.B. School of Public Health, University of North Carolina, Chapel Hill, North Carolina.

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SAXE, LEROY HALLOWELL, JR., B.S., M.A. Institute for Cancer Research, Lankenau Hospital, Philadelphia, Pennsylvania.

STRANDTMANN, RUSSELL WILLIAM, B.S., M.S., Ph.D. Department of Public Health and Preventive Medicine, University of Texas Medical School, Galveston, Texas.

TAKOS, MICHAEL JAMES, B.S., M.S. Department of Biology, Emory University, Georgia.

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WALETZKY, EMANUEL, A.B., A.M., Ph.D. Stamford Research Laboratories, American Cyanamid Company, Stamford, Connecticut.